

# Week 1 (1/19-1/22) Worksheet 1

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## 1 Review

### DEFINITIONS

- linear equation, linear system;
- coefficient,  $\mathbb{R}$  and  $\mathbb{C}$ , variable;
- solution, solution set, descriptive form of solution sets;
- consistent/inconsistent linear systems, equivalent linear systems.

## 2 Problems

**Example 1.** Solve the following linear systems

(a)  $x = 3$ .

(b) 
$$\begin{cases} x + 2y = 4 \\ 3x + y = 7 \end{cases}$$

(c) 
$$\begin{cases} x + 2y = 3 \\ 3x + 6y = 4 \end{cases}$$

(d) 
$$\begin{cases} 2x + y = 4 \\ x + 3y = 7 \end{cases}$$

(e) 
$$\begin{cases} x_1 + x_2 + x_3 = 3 \\ x_1 + 2x_2 + 3x_3 = -1 \\ x_1 + 3x_2 + 5x_3 = -5 \end{cases}$$

**Example 2.** Think about the following questions

- Among the linear systems in 1, which are consistent? Inconsistent? Are there equivalent linear systems?
- Compare the solution sets in (b) and (d), what do you see, and why?

**Example 3.** Find the value of  $c$  such that the following system is inconsistent

$$\begin{cases} x_1 + cx_2 = -1 \\ 2x_1 - 2x_2 = 0 \end{cases}.$$

**Example 4.** Find the value of the coefficient  $c$  such that the following two systems are equivalent

$$\begin{cases} x_1 - cx_2 = 0 \\ x_1 + x_3 = 0 \end{cases}, \quad \begin{cases} 2x_1 - x_2 + x_3 = 0 \\ x_2 + x_3 = 0 \end{cases}.$$